

<b>Working Draft for Discussion -- Subject to Change</b> <b>Preliminary Evaluations of the SDI Alternatives</b> rev. 5/12/99 smb 1100 hr			
Impact Feasibility Issues	Technical Issues to address	Alternative Ratings	
		Single Barrier Alternative	Multiple Barrier Alternative
2 Existing Technology	Questionable or untested technology	1. Intake Structure Screens (10,300-cfs) 2. Agricultural Screening application to tidal locations	same + 3. Rubber dam at Grant Line Canal barrier site (if rubber dam option chosen)
3 Logistics/Timing	Completion by end of Stage 1	Based on current draft schedule, 10,300 cfs screened intake will be completed after end of Stage 1. For description of screening sequence see SDI Alternatives items 1-6 and 24a.	same
4 Availability	Sufficient flows for interior south Delta water quality	Questionable opportunity to acquire from 0 to more than 240 TAF needed to provide equivalent protection in wet to critically dry years, respectively.	not a component of this alternative
5 Manageability, Jurisdiction To Do the Work	Components		
6	Dredge south Delta channels	Initial disposal of 3.5 - 4 million cubic yards of dredge spoils, plus disposal of maintenance dredging	Initial disposal of less than 1 million cubic yards is more manageable
7	Extend Ag diversions & add Fish Screens	Voluntary compliance with this component is questionable	same policy concern but fewer diversions may need to be extended, and likelihood of cooperation is greater. Option A, with no GLC will require the most ag diversion extensions. Option B is similar to A, because GLC barrier is open during peak irrigation period. Option C will require extension of diversion intakes west of barriers only.
9	Fish Structure at HOR	Conflicts in operating the structure between salmon and delta smelt in spring. Need to balance benefits and impacts.  City of Tracy's NPDES permit dilution requirements may be impacted by HOR barrier operation.	same
12 Costs	Components		
13	New SWP Intake Structure	Very rough estimated total intake cost is about \$550 million for an average maximum daily export capacity of 10,300 cfs. (The Northeast location is likely to be \$20-\$40 m less expensive than the proposed north west location because it doesn't require siphon under Italian Slough and an extended intake channel.)	same

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14	New Screens for CVP Exports at TPP or CCFB	<p><i>Very rough estimated cost of building new fish screens for Tracy Pumping Plant or enlarging CCFB intake capacity to include CVP pumping is about \$230 million for an average maximum daily CVP export capacity of 4600 cfs. Cost of 4600 cfs intertie between CCFB and Tracy PP intake is about \$40 million. Total for additional screens plus intertie would be about \$ 270million.</i></p>	same
	Dredge Old River and dispose of materials	<p>Dredge less than 50,000 cubic yards (\$500,000). Price will vary with location of dredge disposal site. Potential to offset cost through sale of dredged materials for reuse elsewhere. (Northeast intake: Dredge an additional 150,000 cubic yards (\$1.5-million)).</p>	same
	Dredge south Delta channels and dispose of materials	<p>Dredge interior south Delta channels (2 million cubic yards); Old River adjacent to CCF and Tracy PP intakes 500,000 cy; San Joaquin River (1.0-1.5 million cubic yards) Total: 3.5-4.0 million cubic yards; at cost of \$35-40 million</p>	<p><b>Dredge downstream of barriers ( near DMC, &amp; CCF intake 500,000 cubic yards).</b></p> <p><b>If GLC can not operate until August or is not installed,</b> dredging will total approximately 350,000 cubic yards to protect ag lands not served by a flow structure needing additional protection (Grant Line Canal, Four Corners Area, Salmon Slough, Old River upstream of Tracy Blvd. to the Head of Old River.</p> <p><b>If GLC can operate from June through September,</b> dredging downstream of Grant Line Canal eastern barrier site (75,000 cubic yards)</p> <p>Total: 575,000 - 850,000 cubic yards; at cost of \$6 - 9 million</p>
15	Extend Ag diversions & add Fish Screens to provide ag water supply	<p>Consolidate, extend, and screen ag diversions in the south Delta as appropriate. Potentially 127 ag diversions in south Delta could be screened at an estimated cost of \$6,350,000, assuming all intakes are screened. Assume \$10,000/diversion per cfs diversion.</p>	<p>12 - 20 diversions would need to be extended, then screened. cost estimate is \$600,000 to \$1.0m</p>
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Feasibility Issues	Issues to address	Single Barrier Alternative	Multiple Barrier Alternative
			Middle River: \$3.9 Million
	Flow Structures	Not Applicable	Old River at Tracy: \$7.8 Million
17			Grant Line Canal (rubber dam): \$7 Million or
18	Fish Structure at HOR	\$12.2 Million	Grant Line Canal (Radial Gates): \$15.6 Million
			same
	O & M	O&M costs for: - fish screens - dredging of south Delta Channels ( <b>Assuming 10% annual cost, \$4 m/yr</b> ) - intake facilities - HOR fish structure	O&M costs for: - fish screens, cost reduced compared to single barrier alt - dredging of south Delta Channels ( <b>Assuming 10% annual cost, \$0.9 m/yr</b> ) - flow control structures - intake facilities (same) - HOR fish structure (same)
22			
23	San Joaquin Flow Augmentation	Assume \$100 per acre-feet Total acre-feet required: 0-240 TAF/yr Total cost: up to \$24 m/yr	Not Applicable
	Restoration	CALFED ERP actions are to be staged over 30-years. Over 40,000 acres are listed for south Delta restoration, plus another 75-miles of riparian habitat and delta slough improvements (approximately 180 additional acreage of waterside land). At \$3,500 per acre, this land acquisition would cost approximately \$140-Million. Assume restoration costs are in addition to acquisition costs.	Same as 1
24			
	Mitigation for...	Intake and Screen construction HOR Structure construction Dredging Navigation and Recreation	Intake and Screens (same as single barrier alternative) HOR Structure (same as single barrier alternative) dredging (less than single barrier alternative) 2 - 3 flow control structures footprint impacts Operational impacts on fisheries due to barriers Navigation and recreation impacts greater than single barrier alternative, but impacts reduced for this alternative if GLC not installed.
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28 <i>Aquatic Habitat Effects</i>	<i>Cause/Species impacted</i>		
29	Direct Fish Losses at SWP/CVP Intake Structure(s)	<p>Predation within the forebay will be eliminated (75-98%), but there will be remaining predation losses (15%) at the screens. Increased flow from central Delta when the HOR barrier is in place will expose a larger number of central Delta and Sac River fish and a fewer number of SJR fish to predators at the new intake in April and May. Improved fish handling procedures will improve fish survival.</p>	<p>same as 1 except that multiple barrier alternative operates during late spring and summer and creates larger increases in net upstream flows in channels. Comparably the hydrodynamic alterations cause more numbers of fish to be exposed to predators at the intake and therefore higher mortality rate through predation. If GLC structure is not installed impacts will be less severe.</p>
30	Effects of Flow Control Structures on Fish Predation	<p>Predators are likely to become concentrated around the HORB. Fish near the structure are likely to be exposed to higher rates of predation.</p>	<p>Greater increase in predatory opportunity and a reduction in fish opportunity for escapement results in increased fish mortality with multiple barrier structures. Impacts associated with predator concentrations and predation rates will be significantly higher. Due to the limited number of juvenile salmon that are likely to use Middle River the impact in that waterway is likely to be insignificant. The ORT structure represents a greater risk to both salmon and estuarine fish. The greatest risk of impact is associated with the GLC structure. Eliminating the GLC barrier substantially reduces the risk of impact</p>
31	Effects of Flow Control Structures on Migration (blockage)	<p>The HORB, when closed in the spring, will reduce juvenile San Joaquin salmon smolt losses in the south Delta. Comparably this alternative provides a benefit without creating unidirectional flows, avoids blockage within the southern Delta, and maintains the opportunity for other Delta aquatic species to migrate through the Delta.</p> <p>In the fall, barrier operation without flow down the HOR may block adult salmon migration into the San Joaquin River. However, the net effect is improved fish passage</p>	<p>Benefits of operating HORB is similar to Single Barrier alternative. Aquatic organisms can be blocked by the flow control structures and become trapped behind the barriers and their movement restricted. Normal transport downstream will be hindered since channel flows will be altered and limited to an upstream instead of downstream direction on the ebb tide. All three flow control structures result in the greatest impact. Limited operation of GLC coupled with monitoring under Options B and C will also reduces impacts. If GLC is not installed impacts will be even less severe.</p>

## Preliminary Evaluations of the SDI Alternatives

## Alternative Ratings

sdi\_ratings.xls

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Feasibility Issues	Issues to address	Single Barrier Alternative	Multiple Barrier Alternative
	Community Energetics	Complex and uncertain. SDIT could not agree. Natural rates of productivity, nutrient transport, and nutrient loading are likely not to be affected by the HORB.	Complex and uncertain. SDIT could not agree. Effects of operating HORB is similar to Single Barrier alternative. Flow control structures may degrade and interfere with the natural rates of productivity, nutrient transport, and nutrient loading trend in the diversity, abundance, composition, and distribution of native phytoplankton or zooplankton assemblages. Effects in Middle River will be minimal. If GLC flow control structure is not installed impacts will be less severe.
40 San Joaquin River Basin Steelhead		HOR barrier contributes to flow changes which, on the whole, improve survival	HORB barrier improves smolt survival however, when <b>operating</b> the other flow control structures contribute to increased mortality.
41 San Joaquin fall-run chinook survival	Smolt	HOR barrier contributes to flow changes which, on the whole, improve survival	HORB barrier improves smolt survival however, when <b>operating</b> the other flow control structures contribute to increased mortality. (no agreement on: Mortality greatest when GLC flow structure is in). Installation as early as June reduces risk
42 Adult salmon passage	San Joaquin Salmon passing thru south Delta	HOR barrier contributes to flow changes which, on the whole, improve survival. However, delays in migration of adult San Joaquin salmon which move upstream through Old River, GLC, and Middle River are likely to impact their survival.	Risk of delays of adult salmon; MR least likely to be a concern; ORT next highest concern; GLC most significant.
43 Sacramento River Salmon Survival	Juvenile Salmon	Operation of the HORB barrier contributes to flow changes that could affect SR salmon smolt survival.	Other barrier operations are not likely to contribute to increasing losses.
44 Survival of other delta native fishes	Delta smelt and splittail	Operation of the HOR barrier contributes to flow changes that reduce delta smelt and splittail survival.	Operation of all three structures contributes to flow changes that can significantly reduce delta smelt survival especially in the south Delta. If GLC structure is not installed impacts will be less severe.
45 Terrestrial Impacts		Construction of the HORB will result in only small impacts on terrestrial habitat. Dredging will be significant and will result in impacts of 500 to 1,000 acres due to dredge spoil storage	Construction of the HORB will result in only small impacts on terrestrial habitat. Dredging in GLC if GLC is not constructed will be significant and will result in impacts of 200 to 300 acres due to dredge spoil storage Construction Activities: Prolonged period affecting; Raptor nests, loss of 5.8 A cropland. ORT removes 1000 feet Mason's Lil. Colony
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51 Navigation/ Transportation Impacts	Middle River	Not Applicable	Construction Activities: Prolonged period affecting; Raptor nests, loss of 5.8 A cropland. ORT removes 1000 feet Mason's Lil. Colony Relatively minor boat traffic in reach upstream of barrier. A boat ramp and operator will accommodate recreational boat traffic.
	Old River at Tracy	Not Applicable	Will significantly interfere with navigation and recreation. To minimize and mitigate impacts, structure has flashboards to allow barges to pass. When the flashboards are not in place, recreational boat traffic may also pass. When the flashboards are in place, boat traffic may use a boat lock.
	Grant Line Canal	Not Applicable	Will significantly interfere with navigation and recreation. To minimize and mitigate impacts, structure has flashboards to allow barges to pass. When the flashboards are not in place, recreational boat traffic may also pass. When the flashboards are in place, boat traffic may use a boat lock. Impacts will only occur if this barrier is installed (Options B and C), and increase with longer periods of closure.
	Head of Old River	Structure will flashboards to allow barges to pass. When the flashboards are not in place, recreational boat traffic may also pass. When the flashboards are in place, boat traffic may use a boat lock. The delay and inconvenience of lock passage constitutes a minor impact on navigation and recreation because the barrier is only operated for 2 months out of the year, before and after peak recreational use.	same
54 Recreation Impacts	Middle River Barrier		Conflict with San Joaquin County General Plan. Significant adverse impact
55	Old River at Tracy Barrier		Conflict with San Joaquin County General Plan. Significant adverse impact
56	Grant Line Canal Barrier		Conflict with San Joaquin County General Plan. Significant adverse impact
57	Head of Old River Barrier	Conflict with San Joaquin County General Plan. Significant adverse impact	Conflict with San Joaquin County General Plan. Significant adverse impact
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Land Use/ Planning		Increased area for dredge disposal sites <i>may</i> take ag land out of production, possibly permanently. <b>Alternative disposal sites on Delta levees or for Franks Tract Restoration could minimize or eliminate this impact.</b> -Intake at North Western location will reduce ag land production on Byron Tract.	Intake at North Central location will reduce ag land production on Byron Tract.
South Delta Stages		HOR operation causes drop in south Delta water levels up to 2 ft when closed in spring and fall. Increasing summer flows by 1000 cfs in June - September may raise stages by about 1.0 foot at Vernalis, about 0.5 foot at HOR, and decreasing slowly westward to insignificance by the longitude of Tracy Blvd. Channel dredging and lowering ag diversion intakes where required would address water availability for all diversions in the south Delta area.	HOR operation causes drop in south Delta water levels up to 2 ft when closed in spring and fall. MR and ORT operation improves water levels by about 1 foot. GLC operation increases south Delta water levels another 1 to 1.5 feet when operated according to Option C ( <b>9 hours or less</b> )
68 South Delta Water Quality: Electrical conductivity, Total Dissolved Solids	SWP Intake	Slightly worse – HOR causes more SJR water at pumps.	same
71	CVP Intake	Slightly better- HOR causes less SJR water at pumps.	same, plus additional improvement during summer from hydraulic barrier effect; best w/GLC
72	CCWD Intakes	Slightly worse – HOR causes more SJR water at pumps.	same
73	South Delta Region, Local Intakes	Slightly better- HOR causes less SJR water at pumps.	More improvement due to ag barrier effects keeping <del>SJR</del> salts out of area; best w/GLC
74	Central Delta Region, Local Intakes	Slightly worse during HOR operation; slightly better from increased SJR	No change w/MR, ORT only; but GLC results in slight degradation; slightly worse during HOR operation
75	City of Tracy Effluent Discharge Dilution	HOR operation in spring and fall degrades ability to meet NPDES requirements. Additional SJR flows slightly improve water quality	HOR operation in spring and fall degrades ability to meet NPDES requirements. Agricultural barriers improve circulation, resulting in more favorable discharge conditions. Best w/GLC.
76	San Joaquin River Dissolved Oxygen	DO improves w/HOR barrier operation. Additional SJR flows also improves summer DO and Ec	DO improves w/HOR operation. Agricultural barrier operations improve DO but slightly degrade Ec in summer.
77	San Joaquin River Salinity	Increased summer flows will improve VNS water quality	no effect



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<i>Actions for which benefits and impacts were not evaluated</i>		Screening Tracy Fish Facility or enlarging CCFB	same
		SWP/CVP Intertie	same
		Ag intake screening	same
		Aquatic and terrestrial habitat restoration	same
		Manage dissolved oxygen in SJ River, Stockton area	same
		Ag discharge relocation, consolidation, and/or treatment in south Delta	same
		Implement release of TDS during pulse flow period	same
		Recirculate Delta exports for water quality and flow benefits	same